

Having thus described the preferred embodiments, the invention is now claimed to be:

1. An apparatus for playing video content, the apparatus including:

a video content means (12) for storing at least one video stream (60₁, 60₂), each video stream including a multiplicity of scenes (62₁, 62₂, 64₁, 64₂, 66₁, 66₂, 68₁, 68₂), each scene being described by a corresponding scene signature;

a selection means (44) for selecting a scene signature which is descriptive of video content of a scene a user wants to view;

a means (104) for comparing the selected scene signature with scene signatures of the stored video streams (60₁, 60₂) to identify one or more scenes whose scene signature is similar to the selected scene signature; and

a means (100) for playing the at least one scene whose scene signature is identified as similar to the selected scene signature.

2. The apparatus as set forth in claim 1, wherein each scene (62₁, 62₂, 64₁, 64₂, 66₁, 66₂, 68₁, 68₂) has a length between 30 seconds and 10 minutes, and the scenes (62₁, 62₂, 64₁, 64₂, 66₁, 66₂, 68₁, 68₂) are overlapped at intervals between 1 second and 2 minutes.

3. The apparatus as set forth in claim 1, wherein the scene signatures are constructed using principal components vectors, the principle components vectors being computed by principle component analysis of selected low level features of the video content within the scene.

4. The apparatus as set forth in claim 3, wherein the low level features are selected from a group consisting of: an absolute average luminance parameter, an image luminance difference parameter, a frame complexity parameter, a mean absolute difference (MAD) motion estimation parameter, a motion parameter, an image texture parameter, a color distribution parameter, and a scene composition parameter.

5. The apparatus as set forth in claim 1, wherein the selection means (44) selects a scene signature of a currently playing scene as the selected scene signature.

6. The apparatus as set forth in claim 1, wherein the comparing means (104) identifies a similar scene, which has a smallest signature comparison figure of merit relative to the selected scene signature.

7. The apparatus as set forth in claim 1, wherein the comparing means (104) determines whether the stored scene signatures are similar to the selected signature within a predetermined threshold, the playing means (100) playing a scene whose signature is within the threshold.

8. The apparatus as set forth in claim 7, further including:
a threshold selection means (108) that selects the threshold value.

9. The apparatus as set forth in claim 1, wherein the video content includes a plurality of video streams (60₁, 60₂), and the apparatus further includes:

a stream hop selection means (46) for selecting a current stream (202) which the play means (100) is playing; and

a stream hopping means (204) for comparing scene signatures of scenes of the current stream (202) with scene signatures of the plurality of video streams to identify a similar video stream (206), the stream hopping means (204) causing the play means (100) to transfer the playing to the similar stream (206).

10. The apparatus as set forth in claim 1, further including:
a scene signatures table (92) for storing the scene signatures arranged by similarity, the comparing means (104) accessing the scene signatures table (92) to identify the similar scenes.

11. The apparatus as set forth in claim 10, further including:
a signature computing means (54, 80, 82, 84, 90) for computing the scene signatures and storing the scene signatures in the scene signatures table (92).

12. The apparatus as set forth in claim 11, wherein the signature computing means (54, 80, 82, 84, 90) includes:

a low level feature processor (80) that computes one or more low level video content features;

a principle components projector (82) that projects the low level video content features onto a principle components space to define principle components vectors; and

a scene signature generator (84) that combines the principle components vectors of each scene to define the corresponding scene signature.

13. The apparatus as set forth in claim 11, further including:

a recording means (50) for recording video content, the signature computing means (54, 80, 82, 84, 90) computing the scene signatures as the video content is recorded.

14. The apparatus as set forth in claim 11, wherein the signature computing means (54, 80, 82, 84, 90) includes:

a scene defining processor (54) that defines overlapping scene intervals in the video content, each scene interval defining a scene; and

a signature processor (80, 82, 84) that computes a scene signature over each scene interval.

15. The apparatus as set forth in claim 14, wherein the scene defining processor (54) selects a spacing of the overlapping scene intervals based on a characteristic of the video content.

16. The apparatus as set forth in claim 1, wherein the selection means (44) selects the scene signature from a group of semantically identified scene signature values (122).

17. A method for playing video content, the method including:

selecting a scene signature which describes a composite of characteristics of frames of a video scene;

comparing the selected scene signature with a multiplicity of stored scene signatures which describe scenes of at least one stored video stream to identify at least one scene signature that is similar to the selected scene signature; and

playing at least one scene whose scene signature is identified as similar to the selected stream signature.

18. The method as set forth in claim 17, wherein the comparing of the selected scene signature with the multiplicity of stored scene signatures includes:

computing a scene comparison figure of merit comparing the selected scene signature and each compared scene signature;

quantitatively comparing the scene comparison figure of merit with a threshold; and

based on the computing and quantitative comparing, selecting the similar scene signature.

19. The method as set forth in claim 17, further including:

computing the stored scene signatures based on low level features of the at least one video stream.

20. The method as set forth in claim 19, wherein the computing of the stored scene signatures includes:

performing principle components analysis of the low level features to produce principle component values; and

combining the principle component values within the each scene to define the corresponding scene signature.

21. The method as set forth in claim 19, further including:

recording the at least one stored video stream prior to the selecting, the computing of the stored scene signatures being performed during the recording.

22. The method as set forth in claim 19, wherein the computing of the stored scene signatures includes:

defining overlapping scene intervals in the at least one stored video stream, each scene interval defining a scene; and

computing a scene signature over each scene interval.